

## JEE ADVANCED -2014

### CHEMISTRY

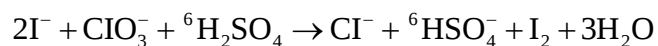
21. In a galvanic cell, the salt bridge

- (A) does not participate chemically in the cell reaction.
- (B) stops the diffusion of ions from one electrode to another.
- (C) is necessary for the occurrence of the cell reaction.
- (D) ensures mixing of the two electrolytic solutions.

22. The pair(s) of reagents that yield paramagnetic species is/are

- (A) Na and excess of  $\text{NH}_3$
- (B) K and excess of  $\text{O}_2$
- (C) Cu and dilute  $\text{HNO}_3$
- (D)  $\text{O}_2$  and 2-ethylanthraquinol

23. For the reaction :



The correct statement(s) in the balanced equation is/are :

- (A) Stoichiometric coefficient of  $\text{HSO}_4^-$  is 6.
- (B) Iodide is oxidized.
- (C) Sulphur is reduced.
- (D)  $\text{H}_2\text{O}$  is one of the products.

24. Upon heating with  $\text{Cu}_2\text{S}$ , the reagent(s) that give copper metal is/are

- (A)  $\text{CuFeS}_2$
- (B)  $\text{CuO}$
- (C)  $\text{Cu}_2\text{O}$
- (D)  $\text{CuSO}_4$

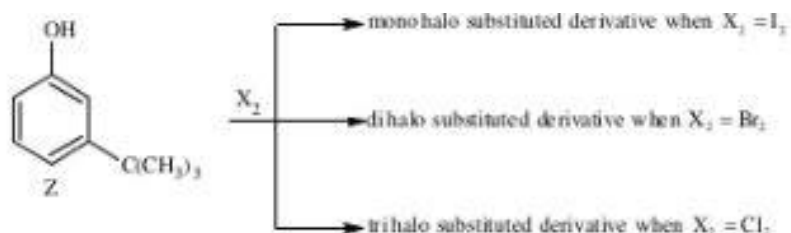
25. The correct statement(s) for orthoboric acid is/are

- (A) It behaves as a weak acid in water due to self ionization.
- (B) Acidity of its aqueous solution increases upon addition of ethylene glycol.
- (C) It has a three dimensional structure due to hydrogen bonding.
- (D) It is a weak electrolyte in water.

26. The correct combination of names for isomeric alcohols molecular formula  $\text{C}_4\text{H}_{10}\text{O}$  is/are

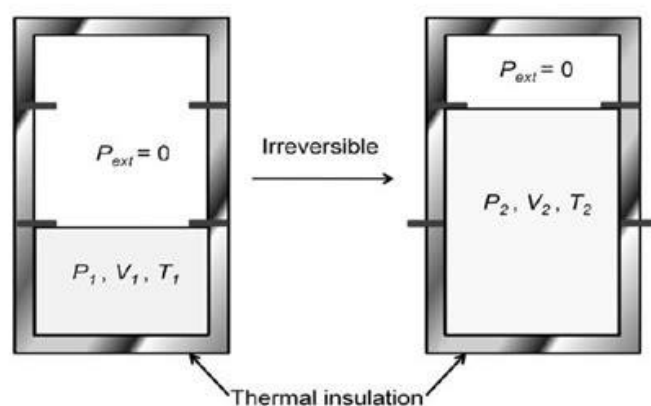
- (A) *tert*-butanol and 2-methylpropan-2-ol
- (B) *tert*-butanol and 1,1-dimethylethan-1-ol
- (C) *n*-butanol and butan-1-ol
- (D) isobutyl alcohol and 2-methylpropan-1-ol

27. The reactivity of compound *Z* with different halogens under appropriate conditions is given below :



The observed pattern of electrophilic substitution can be explained by

- (A) the steric effect of the halogen
  - (B) the steric effect of the *tert*-butyl group
  - (C) the electronic effect of the phenolic group
  - (D) the electronic effect of the *tert*-butyl group
28. An ideal gas in a thermally insulated vessel at internal pressure  $= P_1$  volume  $= V_1$  and absolute temperature  $= T_1$  expands irreversibly against zero external pressure, as shown in the diagram. The final internal pressure, volume and absolute temperature of the gas are  $P_2, V_2$  and  $T_2$ , respectively. For this expansion,



- (A)  $q = 0$
- (B)  $T_2 = T_1$

(C)  $P_2V_2 = P_1V_1$

(D)  $P_2V_2' = P_1V_1'$

29. Hydrogen bonding plays a central role in the following phenomena:

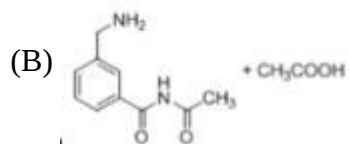
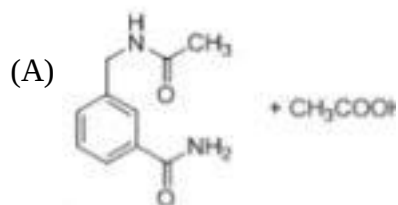
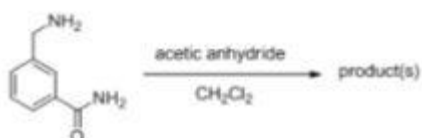
(A) Ice floats in water.

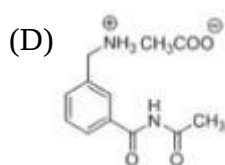
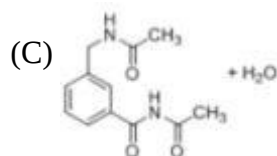
(B) Higher Lewis basicity of primary amines than tertiary amines in aqueous solutions.

(C) Formic acid is more acidic than acetic acid.

(D) Dimerisation of acetic acid in benzene.

30. In the reaction shown below, the major product(s) formed is/are

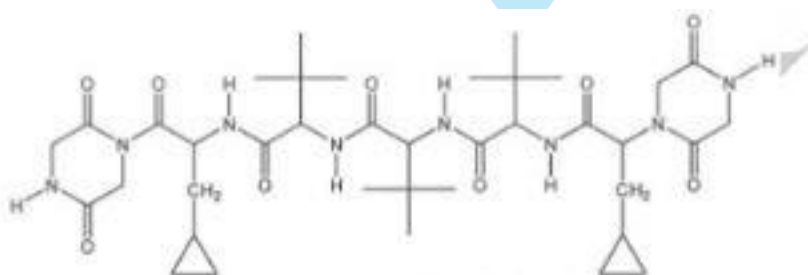




31.  $MX_2$  dissociates into  $M^{2+}$  and  $X^-$  ions in an aqueous solution, with a degree of dissociation ( $\alpha$ ) of 0.5. The ratio of the observed depression of freezing point of the aqueous solution to the value of the depression of freezing point in the absence of ionic dissociation is

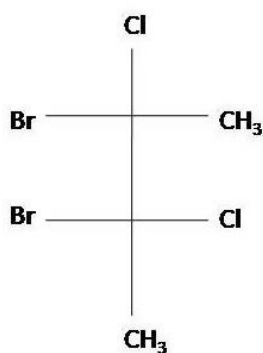
32. In an atom, the total number of electrons having quantum numbers  $n = 4, [m_l] = 1$  and  $m_s = -\frac{1}{2}$  is

33. The total number of **distinct naturally occurring amino acids** obtained by complete acidic hydrolysis of the peptide shown below is

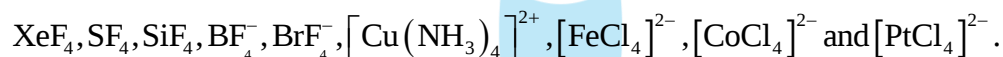


34. If the value of Avogadro number is  $6.023 \times 10^{23} \text{ mol}^{-1}$  and the value of Boltzmann constant is  $1.380 \times 10^{-23} \text{ JK}^{-1}$ , then the number of significant digits in the calculated value of the universal gas constant is

35. A compound  $H_2X$  with molar weight of 80 g is dissolved in a solvent having density of  $0.4 \text{ g ml}^{-1}$ . Assuming no change in volume upon dissolution, the molality of a 3.2 molar solution is
36. The total number(s) of **stable** conformers with **non-zero** dipole moment for the following compound is (are)



37. A list of species having the formula  $XZ_4$  is given below.



Defining shape on the basis of the location of  $X$  and  $Z$  atoms, the total number of species having a square planar shape is

38. Consider the following list of reagents :



The total number of reagents that can oxidise aqueous iodide to iodine is

39. Consider all possible isomeric ketones, including stereoisomers of  $MW = 100$ . All these isomers are independently reacted with  $\text{NaBH}_4$  (NOTE: stereoisomers are also reacted separately). The total number of ketones that give a racemic product(s) is/are
40. Among  $\text{PbS}$ ,  $\text{CuS}$ ,  $\text{HgS}$ ,  $\text{MnS}$ ,  $\text{Ag}_2\text{S}$ ,  $\text{NiS}$ ,  $\text{CoS}$ ,  $\text{Bi}_2\text{S}_3$  and  $\text{SnS}_2$ , the total number of **BLACK** coloured sulphides is

